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THE BIOLOGIST

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A Quarterly Journal Promoting Research
Interest in the Biological Sciences

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1. Calls and presides at Chapter and Executive Committee meetings.
2. Conducts Initiations and Installations as Custodian of the Ritual.

The Vice-President —

1. Acts for and in the absence of the President.
2. Is Chairman of the Membership Committee and directs its activities.
3. Is a member of the Executive Committee.

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National President of Phi Sigma

MEET YOUR NATIONAL OFFICERS

KARL F. LAGLER, National President

Karl F. Lagler, Professor of Zoology, College of Literature, Science and the Arts and Professor of Fisheries and Chairman of the Department of Fisheries, School of Natural Resources at the University of Michigan, was born November 15, 1912 in Rochester, N. Y., of Swiss parents.

He received the degree of Bachelor of Arts in 1934 from the University of Rochester, Master of Science in 1936 from Cornell University, and Doctor of Philosophy in 1940 from the University of Michigan.

Professor Lagler was on the faculty of the University in 1940 as Instructor in Zoology. Previous to that he had been special investigator in fish management in the Museum of Zoology, and, later, Teaching Fellow in Zoology. In 1944, he became Assistant Professor, and the following year, research associate in the laboratory of vertebrate biology.

Before coming to the University of Michigan, he taught botany during the year 1934-35 at the University of Rochester.

Professor Lagler was employed at various times as biologist or consultant for the N. Y. Conservation Department, Wildlife Management Institute, Sport Fishing Institute, Indiana Conservation Department, Shakespeare Company, Hulbert Lake Club, Michigan Department of Conservation and the U. S. Fish and Wildlife Service. He has been a research associate of the Institute for Fisheries Research since 1939 and intermittently also of Cranbrook Institute of Science.

He is a life member of the American Society of Ichthyologists and Herpetologists and American Fisheries Society. He also belongs to the Detroit Academy of Natural Science, Wilson Ornithological Club, Phi Sigma, Sigma XI, and American Association for the Advancement of Science. He is also associated with the Wildlife Society, the American Institute of Biological Science and the Isaac Walton League of America, as well as the Science Research Club and the Research Club of the University of Michigan. Other memberships include American Society of Limnology and Oceanography and the Society for the Study of Evolution.

For several years, Professor Lagler was concerned with the administration of the Trust Fund for Fisheries Research of the Associated Fishing Tackle Manufacturers. He also assisted in the construction of the Lakeside Laboratory at the Newcomb Tract, Base Lake, Livingston County, of the Zoology Department and for many years was in charge of the Tract.

In 1949, he was in charge of the Fish Behavior Fund of the Outboard Boating Club of America. In 1950 Professor Lagler directed the first University telecourse "Man in this World" and later did 100 other education programs on T-V and radio. In the same year he became Associate Professor of Fisheries and Chairman of the Department and Associate Professor of Zoology and in 1955, Professor. In 1953 Professor Lagler was Moderator of the Fishery Section at the Great Lakes Conference. In 1954 he was awarded a Summer Faculty Fellowship. In 1956 he became vice-president and in 1957 president of the University of Michigan Chapter of the American Association of University Professors.

Professor Lagler has served on many university committees, including Honors and Scholarships, Career Leaflets, Public Services, Space and Equipment, Curriculum and Degrees, Student Activities, Executive Committee of the Bureau of Statistical Research, Council of the Great Lakes Research Institute.

In 1956 Dr. Lagler became a founding member and Fellow of the American Institute of Fishery Research Biologists. The year 1957 saw him elected Fellow of the American Association for the Advancement of Science. Also in this year he was awarded one of the coveted Guggenheim Fellowships for 6 months travel and research in Europe. Since 1950 he has been International President of the Council of Phi Sigma, only international honor society in his beloved field of biology.

Professor Lagler married Mary Jane Manchester of Oshkosh, Wisconsin. They have three children, Karl, Susan, and Mary Lou.

His publications include more than a hundred technical and semipopular papers, a laboratory manual for courses in fishery biology, a monograph (with C. L. Hubbs) of the fishes of the Great Lakes Region, and a textbook "Freshwater Fishery Biology." They have won for him international recognition. Over the years Dr. Lagler's graduate students number over fifty at the Master's and Doctoral levels.

* * * * * *

COLLEGES AND CHANGE

Not all change is progress, not all growth is the manifestation of life. Let one part of the body outgrow the rest and you have malignant disease, the threat of death. The growth that is a manifestation of life is equable, draws its springs gently out of the old fountains of strength, builds upon old tissue. . . . Colleges ought surely to be the best nurseries of such life, the best schools of the progress which conserves. Unschooled men have only their habits to remind them of the past, only their desires and their instinctive judgments of what is right to guide them into the future. The college should serve the State as its organ of recollection, its seat of vital memory. It should give to the country men who know the probabilities of failure and success, who can separate the tendencies which are permanent from the tendencies which are of the moment merely, who can distinguish promises from threats, knowing the life men have lived, the hopes they have tested, and the principles they have proved.— Woodrow Wilson, quoted by the Hon. John M. Harlan. (Ginn & Company, 108: 1, 1957)

BIOLOGICAL BASES FOR CONSERVATION OF AQUATIC FOOD RESOURCES

By Karl F. Lagler, Professor and Chairman,
Department of Fisheries, University of Michigan

"The waterscope of the world . . . a green pasture where our children's grandchildren, far removed, will go for meat." (Baber)

The outstanding biological basis for wise use of all natural resources is man's need as constantly aggravated by the accelerated growth of human population. This is dramatically expressed in the statement: each morning 175 thousand mothers look down upon the vague uncomprehending eyes of their newborn babes (Osborn). In relation to world food supply, this means that about 75 thousand new faces come home for dinner each night to seat at a table already serving some 2-1/2 billions! Furthermore, each recent decade has found the individual seats at the table held for a longer time — thanks to advances in medical science that have so steadily increased life expectancy. Small wonder that it has been said: two-thirds of the people go hungry at least some of the time and half the people are hungry all the time (Milner).

The world food problem is made additionally serious by the side-by-side existence of hunger and food surpluses. There is unequal distribution of population and food production, brought about by ideological political and economic barriers to the redistribution of population and food supply, and by regional lags in the application of the most modern technologies for greatest efficiency in obtaining yields of food stuffs. Hunger with plenty in view leads inevitably to the overthrow of government by hungry peoples and the embracement of the nearest hand that seems to assure plenty. Although the ideal solution to the global problem might be a World Food Board, as proposed by Lord Boyd-Orr to the governments of the world in 1946, a more immediate means is to increase production everywhere save perhaps in the United States. The goal would need to approximate a doubling of food output from 1950 to 1975 (Boyd-Orr). As an initial step, the Agriculture Organization (FAO) of the United Nations has already brought about significant gains in the early years of this period simply through educational and training programs in needy areas (Graham and Kestevan). Both agriculture and fisheries are involved, because the greatest need is for proteins and fats (Milner). The yields from fishing and from agriculture may be particularly important.

In order for the soil to give forth food man has had to belabor it. He has had to clear it, drain it, burn it, plow it, fertilize it, plant it, water it, and harvest it or graze it. In so doing, he has inadvertently caused the loss of major portions of it through erosion and has greatly reduced its vital water-spring capacities. By the middle of the twentieth century most of the arable land on earth had been filled much of it lost seriously damaged, and future increases in production had become dependent on the application of more and more complex technologies. In contrast, great increases in fishery yields are possible simply and directly through more harvesting. Although the present annual world take in the commercial fisheries approaches 30 million metric tons (FAO, 1955), we now harvest perhaps only *1* per cent of the full natural production of the seas (Smith and Chapin). This is about a tenth of the world's animal protein food supply. It could easily be more. The inefficiency of man's harvest of naturally produced foods from the earth's waters is realized too when one remembers that the waters are almost three times as great in surface area as the land (FAO, 1953). Much of this water is very productive, producing a greater annual tonnage of vegetable matter per acre than the best hay field (Ratcliff). And an acre of good sea floor can produce nine tons of clam meat in a year (Ratcliff). The unhusbanded food producing potential of the oceans is held by some to be 300 times that of land. It has also been estimated that 90 per cent of all the world's vegetation is produced in the oceans. The sun is the energy source for primary productivity in the land and sea. The promise of the earth surface waters lies in their great extent, their richness in chemical raw materials and in the depths to which sunlight can act in organic synthesis. Whereas primary production in soil is limited to thin top soil and that in the waters may extend up to depths of half-a-mile (Ratcliff). In addition, food crop production on land is restricted to growing-season fractions of years whereas in much of the sea it is a continual process.

We may now consider the question of what it is that waters provide for food now and what the possibilities and limitations are for future discovery, exploitation and development. Man's major foods are animal (including fish), and vegetable. Waters abound in variety of both these food types in a vast array of species and sizes. Plants range from non-flowering microscopic algae, desmids and diatoms to the tree-size kelps and include flowering kinds too. Animals range from minute, single-celled protozoans to ship-sized whales. Practically no surface water on earth is devoid of life, from hot, sunlit springs to cold, dark ocean depths — so great is nature's aptitude for envolving life-forms tolerant of even the most extreme conditions. Much of this life is potential human food; relatively little is inedible; much too is near-perfect food, like fish-flesh; only a small amount is unsuited because of poisonous qualities but even as some land plants are toxic.

On a short range basis, development of aquatic food production as fish alone may be expected at least to double present yields (FAO) without endangering the stocks. Likened to banking, as proposed by Graham, we are at present not drawing all of the interest (available fish crops) which we might without touching the capital (the brood stock required to maintain population). In fact we are wasting "interest" by not drawing it in full measure, and living interest (harvestable fish) dies and then is essentially waste. To double present harvests alone, however, requires increase in fishing efficiency, extension of fisheries into underexploited regions, and use of unexploited species or stocks. Realization of these possibilities depends on economic feasibility: Because of this, development of some fisheries cannot be begun now and that of others will be retarded for some time to come.

Improvement in fishing alone can thus contribute significantly to satisfying human food needs, but this improvement depends on intimate knowledge of fish distribution, behavior, and abundance. Such knowledge must be acquired in order to realize the objective of increased yields through more adequate harvest. We must also understand the biology of such species entering the fishery to keep the harvest of any year or group of years from endangering that of future ones.

That an extension of fishing to underexploited grounds, species, or segments of populations is a realistic way to meet some of man's food needs can be demonstrated. One of these is the relatively unexploited condition of waters of the southern hemisphere from which are now taken only ten per cent of the world's fish harvest. The other is the efficiency with which a fisherman even now produces protein compared to a farmer. The fisherman produces a pound of usable product less basic cost and at much less cost to the taxpayer than does a farmer (in the U. S.). According to the FAO, one man under optimum conditions can raise 50,000 pounds of hog on the hoof in a year. Among domestic animals, hogs (along with poultry) are the most efficient converters of plant material into animal flesh. However, ideal conditions of growing season, freedom from diseases, uninterrupted labor, etc., must exist if the foregoing estimate of 50,000 pounds of hogs per man-year is to be attained. In contrast, each member of the crew of twenty on a New England trawler fishing for cod and haddock accounts for 200,000 pounds per year. This represents about four times the yield of hogs per man-year with which fish compare favorably in food value pound for pound. The average fisherman in the U. S. produces about 24 tons per year and the average farmer, 17. The gain in efficiency in the fishery results from the fact that little or no human effort is expended in cultivation. There is much hope for future increase in fishing effectiveness by additional or new use of means for finding fish to harvest. Included are echo-sounding and echo-ranging, television, and airplanes. Looking well for the future also are prospects of attracting and capturing fish by use of light, chemicals, sound and electricity.

As pointed out by Ricker, 1946, it may be possible to increase fish production and yield by getting a more efficient conversion of primary plant production into the form of fish flesh. Present estimates suggest a general conversion at a level of less than one per cent. The suggestion is that more than a hundred pounds of phytoplankton are required to produce a pound of the average fish. Hopefully, however, in a program that emphasizes cultivation and harvest of vegetarian fishes (or any similar move to take advantage of shortened food chains) increased production of fish flesh can be anticipated. There is no doubt, for example, that identical bodies of water would support more carp in pure culture than predaceous pike. There is also no doubt that greater poundages of plankton-eaters could be harvested from the sea than carnivorous fishes which eat the plankton-feeder. But we know so little of the mechanism which regulates these differences that we can make little use of it as yet for augmenting fish crops. Furthermore, all kinds of fish are not equally acceptable to consumers at any one time in history. However, man's food preferences (or tolerances) are known to change with time. There was a time when rosefish were spurned in the market, yet today, as fillets, they are widely distributed and enthusiastically consumed (under the name of ocean perch).

On a long range basis it is both realistic and possible to expect that the waters of the earth could be managed to produce food crops exceeding present land crops. This might be achieved by changing the sea alone, without the inland waters, from its present hunter's realm to a salt area of cultivation and harvest (Smith and Chapin). But, in order to cultivate the aquatic habitat for food we need to know much that is now unknown. To be discovered are life cycles, location, abundance and interrelations (including food chains) of a myriad of organisms, plant and animal, simple and complex, small and large. To be understood are the rates at which they may be harvested as "interest" without endangering future supplies by damaging the capital. Summarily, we need to understand cropping in relation to basic productivity in waters to be cultivated on any basis, long range or short range. As Michael Graham has written; in this regard: "I have myself found it useful to consider a lawn that is regularly mown, and to reflect that a lawn is cropped at the rate of 2,400 per cent per annum; and yet is not depleted. I assume that 50 per cent of the grass substance is taken away twice a week, that is about 400 per cent per lunar month, and the cutting season lasts about six months; so the total rate per annum is about 2,400 per cent." Similarly, in theory, there could in a year be taken out of a body of water more fish, of fishable size, than were ever in it. The problem in lawn management is clearly to discover the optimal relationship of care (which produces growth), the height at which the blades of the mower are set, and the frequency with which it is used. The parallel biological basis in aquatic resource management for optimal sustained yields is similarly to regulate cultivation and harvest (Graham). But in order to do this, the manner of cultivation must be known.

Cultivation of fishes, or aquiculture in broad sense, parallels land farming. Plowing is required to make nutrient chemical elements available to the first (plant) links of the chain of productivity. In aquiculture, natural water movement does the plowing for us. The dissolving power of water and water movement as in stream currents and thermal currents make chemicals available in solution. Some are even kept in rotation by being used in life, deposited on the bottom, released, and circulated upward and onward to be available to new life. The work of surface runoff and inland rivers in leaching and transporting elements from the rocks and soil is evident. Not quite so obvious are the workings of the "rivers of the sea" such as the Gulf Stream and many other currents that are both horizontal and vertical in their direction (Sverdrup). Almost every student of biology knows how temperate lakes turn themselves upside down in spring and fall and how, concommitantly, oxygen is carried to the bottom and chemicals liberated from the bottom are distributed throughout the water mass to become available to new life.

Artificial fertilization in aquiculture, as in agriculture, may increase crop yields (Lagler). Fertilized farm fish ponds in the southern United States support 4 to 5 times as great a weight of fish as unfertilized ones. By carefully integrated programs of fertilization and fish harvest (using vegetarian fishes) from 4,000 to 7,000 pounds of fish have been cropped per acre of water per year. Experimental fertilization of arms of the sea has resulted in increased fish growth. But fertilization of all waters is neither feasible nor practical. Furthermore, fertilization has no lasting results unless it is more or less continual. Chemical additives are rapidly taken out of circulation by plants and become available for further use only after lengthy periods of decay — periods sometimes so long that the elements are lost by burial in bottom deposits. If aquatic plant crops are sought, they may be stimulated by fertilization. Some species are highly prized as food by man (*e.g.*, water chestnut) and many are useful in feeding domestic animals (comparing well with good hay in food value).

A logical beginning for the cultivation of the crop is consideration of the seed and the planting of the seed once obtained. Through the application of genetics to plants and animals man has been able to produce many desired benefits to production. Among these benefits are increased growth, resistance to disease, and tolerance of environmental extremes. In aquiculture the possibilities of selective breeding are best illustrated in the large variety of forms resulting from some 2,000 years of work on the goldfish in Asia. Potential success of aquatic farming is best shown in the large crops now steadily and annually obtained through oyster culture. In this highly developed form of aquiculture the submarine fields are readied for planting by distribution of clean oyster shells over them. The young seed oysters are grown artificially, planted, and thinned after they are set, pests are controlled, and the adults are carefully harvested at the proper times. Sometimes fish are transplanted to areas where they may make better growth (as the plaice, a flatfish in the North Sea or stream-running rainbow trout into coastal waters). Other fish are planted to maintain stocks endangered by such damaging human activities as pollution and dam construction. Illustrative here is the artificial propagation and stocking of the American Pacific salmons. Important in Asia and the Philippines are the annual plantings of fry in ponded sea waters (milkfish) and in rice paddies (carps and others) and their harvest after growth. In local communities these fish are principal sources of protein food. Side stepping fish, on an intensified and ideal aquicultural basis it may become possible to propagate unicellular algae (*e.g. chlorella*) on a year-around basis to get 40 tons dry-weight per acre. Considering that 40 tons of *Chlorella* contains 20 tons of protein and 3 tons of fat, aquicultural production of protein and fat per acre per year is dwarfed in comparison (Milner).

Sometimes aquicultural plantings, as agricultural ones, have been successful in establishing non-native species. Unfortunately some of the introduced species of fish, as well as plants, have turned out to be weeds (as European carp are regarded in many American waters in which they have become established) whereas others afford valuable fisheries. Although introduced species may not increase production, they may do so in effect by providing fish stocks which are more exploitable and/or favored for consumption as food than native ones (such as the shad and the striped bass introduced on the Pacific Coast of America from the Atlantic). The overall prospect of plantings for increasing fish crops is, however limited. For one thing, it is generally agreed that much more needs to be known about fishes contemplated for stocking, be it for maintenance or introduction, than is or has been in hand up to now.

I have attempted to focus your attention on a few aspects of man's need for conservation of food resources and on some possibilities in development of existing aquatic potentials. Such development entails proper application of human powers (a natural resource in themselves) (Allen) to solving problems of productivity on land, in the laboratory, and in water. It is only when the natural processes are known that we can exercise the wisdom in use and development that good conservation practice requires (Merriman). Nature must be understood before we can abundantly harvest her bounty with continuity. In meeting world food needs of the future, the role of the biologist looms large and very significant and the aquatic biologist may have a role of unusual significance. The bases for the wise use of living aquatic resources are indeed and manifestly biological.

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A CRISIS IN LEARNING

Modern man possesses a vast and rapidly expanding supply of knowledge. There are many causes for this, including the persistent application of scientific procedures to the whole compass of human experience, the invention of instruments whereby the precision and range of inquiry have been greatly increased, the explosive growth in world population, with a corresponding rise in the numbers of workers in every field of inquiry, and the provision of extensive libraries and museums for preserving the accumulated treasures of the past. Furthermore, modern facilities for travel and communication have made available the major part of the whole world's store of knowledge to anyone who wishes to use it. . . .

Not only is knowledge available in abundance, but the requirements of modern life place a premium on mastering it. A highly complex industrial society can endure only if it is cared for by persons of technical competence and social wisdom. The demand for technical mastery has been the basis for specialization in education, through which the requisite ability in a restricted field is developed at the expense of broader understanding. The demand for social wisdom, on the other hand, has been met, in the general education movement, by the complementary emphasis on breadth of comprehension.

(Continued on page 40)

SOME WAYS IN WHICH THE SHORTAGE OF HIGH SCHOOL BIOLOGY TEACHERS MAY BE ALLEVIATED

By W. N. Steil

Introduction

The teacher shortage at the present time in the United States is most critical. It exists in all schools — both public and private — in the grades, the high schools, and in the Colleges and the Universities. In a few years, the shortage will be much greater.

Many excellent articles have recently been written on the causes for the shortage. However there seems to be no unanimity of opinion on the factors related to the shortage, or the ways in which it might be alleviated.

Undoubtedly, one of the causes of the shortage is the great increase in the birth rate after the Second World War. There are, however a number of other factors which have caused the shortage. The writer has chosen to make brief reference to some of them.

In the past few years, fewer young men and women have chosen the teaching profession. It is also known that a much smaller number of College and University graduates, who qualified for teaching chose a major in mathematics or the sciences, including biology (Botany and Zoology). In 1950, 9100 or our College and University graduates were qualified to teach science. In 1955, the number declined to 4,000 — a drop of 56%. In biology the number was 54%.* It is not surprising, that there is a shortage of adequately qualified high school biology teachers. The shortage, however has been alleviated somewhat by engaging "substitutes" for teaching biology — one of the most important subjects in the high school curriculum. They now comprise about 40% of all those teaching high school biology. They are inadequately qualified to teach the subject and they cannot be expected to be inspiring teachers. They will not arouse in their students much interest in the study of living things — both plants and animals. It is not an exaggeration to state that few of their students who plan to continue their education in a higher institution will choose biology as their major subject.

Salaries

The low and often inadequate salaries paid to teachers, including high school biology teachers, is usually given as the main reason why many young men and young women who graduate from our Colleges and Universities do not enter the teaching profession. No doubt, the higher salaries which are at present offered by many schools will not only encourage a greater number to qualify for teaching positions, but will also enable many of those now in active service to continue teaching.

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*A-I-B-S Bulletin, Jan. 1955 Editorial by Mrs. Culp Hobby, Secretary of Health, Health and Welfare.

Some school systems are not only offering higher salaries, but have made them flexible so that increments are dependent not only on years of service but also upon the quality of teaching. To encourage men to enter the profession salaries paid to them in some schools are higher than those paid to women. It is logical that there be no discrimination in the salaries paid to men and women, but it is also reasonable that the income received by a teacher should be sufficient to maintain his dependents. More liberal pensions and social security will also attract a larger number of men and women to the teaching profession.

The writer, however, is not convinced that higher salaries and other material benefits offered to our College and University graduates will attract a sufficient number of adequately qualified teachers. No one will question the fact that the large majority of our most excellent teachers now in service in our schools never chose the teaching profession because of the income they would receive or for the prestige they might enjoy. They chose the profession mainly because they desired to teach rather than to do anything else. They also liked children and youth.

The Prestige of the Teacher

The loss of the prestige of the teacher is undoubtedly one of the reasons why many of our College and University graduates have not chosen the profession of teaching.

A number of factors have contributed to the loss of prestige of the teacher. The teacher of today is not only a better teacher than the teacher of yesterday, but is also in full possession of the qualities worthy of imitation of our youth. No one would suggest that the teachers themselves are responsible for the decline in prestige. Perhaps parents are responsible for the loss of prestige of the teacher. Some of them are indifferent to their parental responsibilities in guiding their children to become good men and good women and citizens who have a respect for human dignity, law and order.

Undoubtedly some of the television programs to which even children of pre-school age have been exposed, have done great harm to the teaching profession. Our Miss Brooks, Mr. Peepers, and Blackboard Jungle have not only contributed to the loss of the prestige of the teacher, but have also deterred many of our youth from the teaching profession. Blackboard Jungle represents an exaggerated school situation and hence may give viewers a wrong impression of the average good school. The principal characters in the other two are teachers, generally lacking in intellect and common sense. Such programs should be vigorously protested by all those who have a high regard for the teacher and the teaching profession.

References which have been made in the daily press and in magazine articles to disciplinary problems in certain schools tend to discourage our College and University graduates from choosing the teaching profession. There can be no doubt that these problems have been accurately described, but they rarely present themselves in any average good public school.

The stigma which has for many years been placed upon the scientist has, no doubt, caused a decline in the interest of our youth in the sciences. He has been described in caricature and often represented as a human being quite unlike the rest of the population — eccentric, abnormal in intellect and behavior. It is no wonder that he too has lost his prestige. Even some children have been known to remark "I don't want to be a scientist. I don't want to be a square."

In every school an effort should be made to place the scientist in the high position he has gained, generally with little, if any, monetary reward. He should be presented as one of the greatest assets to our civilization, the future of which may be determined by his discoveries. A great effort should also be made to arouse a greater interest in the sciences, not only in the grades but also in the high schools. To succeed it will be necessary to offer a continuous program in the natural and the physical sciences, beginning in the lower grades. College and University students who plan to teach a high school science should receive special and supervised training.

Retirement

One of the factors related to shortage of teachers is early and indiscriminate retirement. It is generally based on chronological age and not on biological age. The policy is unjust, unwise and uneconomical. It results in the annual loss of thousands of our most excellent teachers at all educational levels — the kindergarten, the grades, the high schools, and the Colleges and the Universities. The method of retirement belongs to an early Incan civilization and is wholly outdated. It should be discontinued at once.

There cannot be even the slightest doubt that many teachers who have been retired on chronological age are still in good health and are still in possession of their full intellectual powers. All of these teachers who are willing to return to teaching positions should be recalled at once.

The writer is suggesting that a questionnaire be submitted to all recently retired high school biology teachers to determine the number willing to return to teaching positions. Should a majority of them be still willing to teach, the present shortage of adequately qualified high school biology teachers would be completely alleviated.

Qualifications of the High School Biology Teacher

Since so many excellent articles have recently been published on the qualifications of the high school biology teacher, a lengthy treatment is superfluous. This important subject is closely related to our supply of future biologists and biology teachers. The adequately prepared biology teacher is usually an inspiring teacher. Only he can interest his students in the subject and induce them to major in biology upon their entrance to a College or a University, and also become high school biology teachers.

Anyone who is not interested in living things and who does not have a true appreciation of their beauty, their wonderful growth, reproduction and of their many other life processes should never become a high school biology teacher. He should not only have an aptitude for teaching but should also like to teach young people.

For the adequate training of the high school biology teacher, courses in both botany and zoology are necessary. These courses should include morphology, cytology, anatomy, physiology, ecology and genetics. Some courses in chemistry are recommended for a teacher of high school biology. A Master's degree with a major in biology is highly recommended.

It is most unfortunate that many high school biology teachers have been advised to obtain a Master's degree with a minor in Biology. The advice, of course, is unsound. Only a Master's degree with a major in Biology is recommended. The undue emphasis on the Master's degree with a major in education originates from the "educationists" who claim that methodology is a substitute for knowledge of the subject matter.

For further information in regard to the domination of the educationists, the reader is referred to the excellent article by Doctur Fuller on the Bureaucy of Education.* He states accurately the opinions of a large majority of non-educationists on the domination of the educationists. Prof. Boyd† challenges a number of statements made by Doctor Fuller. I shall refer to only two of them. He states, with some doubt: "I strongly suspect that any of the critics of education courses themselves have never taken an education course." The writer earned more than 60 hours credit in education courses, and he is one of the many critics of education courses. Another statement by Professor Boyd is the following: "Also in many cases these graduate courses, while they will expand the teacher's experience, they will be of small use in teaching the subject." The graduate courses to which reference is made are non-education courses. The statement is an obvious admission that methodology is a substitute for knowledge of subject matter.

After carefully re-reading Dr. Fuller's article, I am convinced that it contains no exaggeration of facts. It is a most revealing treatment of a subject which has been and still is of much concern to a large number of non-education faculty members of our Colleges and Universities. Quite obviously, integrity is not a luxury in the University in which it is Doctor Fuller's honor to serve. Some of the statements on the bureaucy of education made by other faculty members of Universities may be of interest to the reader. References* to them are listed below.

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*The American Biology Teacher: March, 1956.

†The American Biology Teacher: May, 1956.

Scholarships

Many scholarships for high school students of exceptional ability are offered at the present time by our Colleges and Universities.

The National Merit Scholarship is granted to high school students who rate high in an intelligence test administered by the N. M. S. Corporation, and who have shown good qualities of character and leadership. In 1955-56, 554 Merit scholarships were granted in the United States. Recently 50 additional Merit scholarships have been established 25 of which are supported by the International Business Machines Corporation and are known as IBM's Thomas J. Watson Memorial Scholarship Program. It will be administered with the aid of the N M S C.

The Ford Foundation Grants are made to high school students of exceptional ability who have completed three years of high school work. They have already been made for a period of four years, and has lead to the conclusion that students who have completed three years of high school may successfully complete a College or a University and obtain a degree in the regular four years.

The Arlington Virginia plan is intended only for teachers of mathematics and the sciences, who wish to prepare themselves more adequately in teaching these subjects. It is on an experimental basis. For its administration, it is financially supported by the Arlington area.

The most liberal grants for high school teachers of mathematics and the sciences are those administered by the National Science Foundation which was established about seven years ago. It is supported by a congressional appropriation of $4,065,000. The grants will enable many teachers in active service to obtain a Master of Science degree within a year. The recipient of a grant will receive a stipend of $3,000, and an additional aid to support up to four dependents. The number of grants available for the coming school year will be 750!

The scholarships which may be obtained by high school students interested in Biology will no doubt enable many of them to obtain a College or University education. It is hoped that some of them will not choose Biology as their major subject but will also plan to teach the subject in the high school.

The grants made available by the N. E. F. will encourage many high school biology teachers to obtain a Master's degree in our best Colleges and Universities. The additional knowledge acquired by them will make them better and more inspiring teachers.

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*The Science Counselor: March, 1950.
The Ladies Home Journal: February, 1957.

Summary

1. The shortage of adequately qualified teachers of high school biology is most critical.
2. Higher salaries alone will not attract a sufficient number of adequately qualified high school biology teachers. There are a number of factors which deter many of our young men and women from choosing the teaching profession.
3. The recall of retired adequately qualified teachers of high school biology may alleviate the shortage.
4. It is suggested that a survey be made of the adequately qualified high school biology teachers who have been recently retired to determine how many of them may be willing to return to teaching.
5. Retirement should not be made on the basis of chronological age, but on biological age.
6. Courses in the natural and physical sciences should be offered in all grade schools. All high school students should be advised to take science courses including biology.
7. High school biology teachers should be adequately trained in their special field of knowledge. A Master of Science degree with a major in Biology is recommended for all high school biology teachers.
8. A greater number of scholarships should be made available to high school students of exceptional ability and especially to those interested in biology.
9. The Academic year and the Summer institutes administered by the National Science Foundation will encourage many high school teachers of biology to obtain a Master of Science degree.

Editorial Comment: (By Dr. Henry van der Schalie). The subject of Mr. Steil's article is a timely one. While the following references are not intended to give a broad perspective into this subject, they represent stimulating articles written by authors with wide experience in problems relating to the subject:

Barzun, Jacques M., Teacher in America. New York. Little, Brown & Co., 1945, 321 pp.

Beall, Paul R., The Stranglehold Tightens. Amer. Assn. Univ. Prof. Bull., 35: 504-511, 1949.

Clapp, Harold L., The Stranglehold on Education. Amer. Assn. Univ. Prof. Bull., 35: 335-348, 1949.

Malcolm, David D., The Stranglehold on Education; A Reply. Amer. Assn. Univ. Prof. Bull., 35: 504-511, 1949.

Wheeler, W. M., The dry-rot of our academic biology. Science, 57: 61-71, 1923.

DALLAS LORE SHARP ("Turtle Eggs for Agassiz") was a professor of English in Boston University, a naturalist and a lover of Nature. Professor Sharp was a favorite contributor to the *Atlantic*; his last paper, "The Edge of Night," appeared in October, 1909, while another article by him on our National Clam Farm appeared in an early issue. Reprinted with the permission of the *Atlantic Monthly.*

TURTLE EGGS FOR AGASSIZ

By Dallas Lore Sharp

It is one of the wonders of the world that so few books are written. With every human being a possible book, and with many a human being capable of becoming more books than the world could contain, is it not amazing that the books of men are so few? And so stupid!

I took down, recently, from the shelves of a great public library, the four volumes of Agassiz's *Contributions to the Natural History of the United States*. I doubt if anybody but the charwoman, with her duster, had touched those volumes for twenty-five years. They are an excessively learned, a monumental, an epoch-making work, the fruit of vast and heroic labors, with colored plates on stone, showing the turtles of the United States, and their embryology. The work was published more than half a century ago (by subscription); but it looked old beyond its years — massive, heavy, weathered, as if dug from the rocks. It was difficult to feel that Agassiz could have written it — could have built it, grown it, for the laminated pile had required for its growth, the patience and painstaking care of a process of nature, as if it were a kind of printed coral reef. Agassiz do this? The big, human, magnetic man at work upon these pages of capital letters, Roman figures, brackets, and parentheses in explanation of the pages of diagrams and plates! I turned away with a sigh from the weary learning, to read the preface.

When a great man writes a great book he usually flings a preface after it, and thereby saves it, sometimes, from oblivion. Whether so or not, the best things in most books are their prefaces. It was not, however, the quality of the preface to these great volumes that interested me, but rather the wicked waste of durable book-material that went to its making. Reading down through the catalogue of human names and of thanks for help received, I came to a sentence beginning: —

"In New England I have myself collected largely; but I have also received valuable contributions from the late Rev. Zadoc Thompson of Burlington; . . . from Mr. D. Henry Thoreau of Concord: . . . and from Mr. J. W. P. Jenks of Middleboro'." And then it hastens on with the thanks in order to get to the turtles, as if turtles were the one and only thing of real importance in all the world.

Turtles no doubt are important, extremely important, embryologically, as part of our genealogical tree; but they are away down among the roots of the tree as compared with the late Rev. Zadoc Thompson of Burlington. I happen to know nothing about the Rev. Zadoc, but to me he looks very interesting. Indeed any reverend gentleman of his name and day who would catch turtles for Agassiz must have been interesting. And as for Henry Thoreau, we know he was interesting. The rarest wood-turtle in the United States was not so rare a specimen as this gentleman of Walden Woods and Concord. We are glad even for this line in the preface about him; glad to know that he tried, in this untranscendental way, to serve his day and generation. If Agassiz had only put a chapter in his turtle book about it! But this is the material he wasted, this and more of the same human sort, for the Mr. Jenks of Middleboro' (at the end of the quotation) was, years later, an old college professor of mine, who told me some of the particulars of his turtle contributions, particulars which Agassiz should have found a place for in his big book. The preface says merely that this gentleman sent turtles to Cambridge by the thousands — brief and scanty recognition. For that is not the only thing this gentleman did. On one occasion he sent, not turtles, but turtle *eggs* to Cambridge — *brought* them, I should say; and all there is to show for it, so far as I could discover, is a sectional drawing of a bit of the mesoblastic layer of one of the eggs!

Of course, Agassiz wanted to make that mesoblastic drawing, or some other equally important drawing, and had to have the fresh turtle egg to draw it from. He had to have it, and he got it. A great man, when he wants a certain turtle egg, at a certain time, always gets it, for he gets some one else to get it. I am glad he got it. But what makes me sad and impatient is that he did not think it worth while to tell about the getting of it, and so made merely a learned turtle book of what might have been an exceedingly interesting human book.

It would seem, naturally, that there could be nothing unusual or interesting about the getting of turtle eggs when you want them. Nothing at all, if you should chance to want the eggs as you chance to find them. So with anything else, — good copper stock, for instance, if you should chance to want it, and should chance to be along when they chance to be giving it away. But if you want copper stock, say of C & H quality, *when* you want it, and are bound to have it, then you must command more than a college professor's salary. And likewise, precisely, when it is turtle eggs that you are bound to have.

Agassiz wanted those turtle eggs when he wanted them — not a minute over three hours from the minute they were laid. Yet even that does not seem exacting, hardly more difficult than the getting of hen eggs only three hours old. Just so, provided the professor could have had his private turtle-coop in Harvard Yard; and provided he could have made his turtles lay. But turtles will not respond, like hens, to meat-scraps and the warm mash. The professor's problem was not to get from a mud turtle's nest in the back yard to the table in the laboratory; but to get from the laboratory in Cambridge to some pond when the turtles were laying, and back to the laboratory within the limited time. And this, in the days of Darius Green, might have called for nice and discriminating work — as it did.

Agassiz had been engaged for a long time upon his *Contributions*. He had brought the great work nearly to a finish. It was, indeed, finished but for one small yet very important bit of observation: he had carried the turtle egg through every stage of its development with the single exception of one — the very earliest — that stage of first cleavages, when the cell begins to segment, immediately upon its being laid. That beginning stage had brought the *Contributions* to a halt. To get eggs that were fresh enough to show the incubation at this period had been impossible.

There were several ways that Agassiz might have proceeded: he might have got a leave of absence for the spring term, taken his laboratory to some pond inhabited by turtles, and there camped until he should catch the reptile digging out her nest. But there were difficulties in all of that — as those who are college professors and naturalists know. As this was quite out of the question, he did the easiest thing — asked Mr. Jenks of Middleboro' to get him the eggs. Mr. Jenks got them. Agassiz knew all about his getting of them; and I say the strange and irritating thing is, that Agassiz did not think it worth while to tell us about it, at least in the preface to his monumental work.

It was many years later that Mr. Jenks, then a gray-haired college professor, told me how he got those eggs to Agassiz.

"I was principal of an academy, during my younger years," he began, "and was busy one day with my classes, when a large man suddenly filled the doorway of the room, smiled to the four corners of the room, and called out with a big, quick voice that he was Professor Agassiz.

"Of course he was. I knew it, even before he had had time to shout it to me across the room.

"Would I get him some turtle eggs? he called. Yes, I would. And would I get them to Cambridge within three hours from the time they were laid? Yes, I would. And I did. And it was worth the doing. But I did it only once.

"When I promised Agassiz those eggs I knew where I was going to get them. I had got turtle eggs there before — at a particular patch of sandy shore along a pond, a few miles distant from the academy.

"Three hours was the limit. From the railroad station to Boston was thirty-five miles: from the pond to the station was perhaps three or four miles; from Boston to Cambridge we called about three miles. Forty miles in round numbers! We figured it all out before he returned, and got the trip down to two hours, — record time: — driving from the pond to the station, from the station by express train to Boston; from Boston by cab to Cambridge. This left an easy hour for accidents and delays.

"Cab and car and carriage we reckoned into our time-table; but what we didn't figure on was the turtle." And he paused abruptly.

"Young man," he went on, his shaggy brows and spectacles hardly hiding the twinkle in the eyes that were bent severely upon me, "young man, when *you* go after turtle eggs, take into account the turtle. No! no! that's bad advice. Youth never reckons on the turtle — and youth seldom ought to. Only old age does that; and old age would never have got those turtle eggs to Agassiz.

"It was in the early spring that Agassiz came to the academy, long before there was any likelihood of the turtles laying. But I was eager for the quest, and so fearful of failure, that I started out to watch at the pond, fully two weeks ahead of the time that the turtles might be expected to lay. I remember the date clearly: it was May 14.

"A little before dawn — along near three o'clock — I would drive over to the pond, hitch my horse near by, settle myself quickly among some thick cedars close to the sandy shore, and there I would wait, my kettle of sand ready, my eye covering the whole sleeping pond. Here among the cedars I would eat my breakfast, and then get back in good season to open the academy for the morning session.

"And so the watch began.

"I soon came to know individually the dozen or more turtles that kept to my side of the pond. Shortly after the cold mist would lift and melt away, they would stick up their heads through the quiet water; and as the sun slanted down over the ragged rim of treetops, the slow things would float into the warm, lighted spots, or crawl out and doze comfortably on the hummocks and snags.

"What fragrant mornings those were! How fresh and new and unbreathed! The pond odors, the woods odors, the odors of the ploughed fields — of waterlily, and wild grape, and the dew-laid soil! I can taste them yet, and hear them yet — the still, large sounds of the waking day — the pickerel breaking the quiet with his swirl; the kingfisher dropping anchor; the stir of feet and wings among the trees. And then the thought of the great book being held up for me! Those were rare mornings!

"But there began to be a good many of them, for the turtles showed no desire to lay. They sprawled in the sun, and never one came out upon the sand as if she intended to help on the great professor's book. The embryology of her eggs was of small concern to her; her contribution to the Natural History of the United States could wait.

"And it did wait. I began my watch on the 14th of May; June first found me still among the cedars, still waiting, as I had waited every morning, Sundays and rainy days alike. June first was a perfect morning, but every turtle slid out upon her log, as if egg-laying might be a matter strictly of next year.

"I began to grow uneasy, — not impatient yet, for a naturalist learns his lesson of patience early, and for all his years; but I began to fear lest, by some subtile sense, my presence might somehow be known to the creatures; that they might have gone to some other place to lay, while I was away at the schoolroom.

"I watched on to the end of the first week, on to the end of the second week in June, seeing the mists rise and vanish every morning, and along with them vanish, more and more, the poetry of my early morning vigil.

Poetry and rheumatism cannot long dwell together in the same clump of cedars, and I had begun to feel the rheumatism. A month of morning mists wrapping me around had at last soaked through to my bones. But Agassiz was waiting, and the world was waiting, for those turtle eggs; and I would wait. It was all I could do, for there is no use bringing a china nest-egg to a turtle; she is not open to any such delicate suggestion.

"Then came a mid-June Sunday morning, with dawn breaking a little after three: a warm, wide-awake dawn, with the level mist lifted from the level surface of the pond a full hour higher than I had seen it any morning before.

"This was the day: I knew it. I have heard persons say that they can hear the grass grow; that they know by some extra sense when danger is nigh. That we have these extra senses I fully believe, and I believe they can be sharpened by cultivation. For a month I had been watching, brooding over this pond, and now I knew. I felt a stirring of the pulse of things that the cold-hearted turtles could no more escape than could the clods and I.

"Leaving my horse unhitched, as if he, too, understood, I slipped eagerly into my covert for a look at the pond. As I did so, a large pickerel ploughed a furrow out through the spatter-docks, and in his wake rose the head of an enormous turtle. Swinging slowly around the creature headed straight for the shore, and without a pause, scrambled out on the sand.

"She was about the size of a big scoop-shovel; but that was not what excited me, so much as her manner, and the gait at which she moved; for there was method in it and fixed purpose. On she came, shuffling over the sand toward the higher open fields, with a hurried, determined see-saw that was taking her somewhere in particular, and that was bound to get her there on time.

"I held my breath. Had she been a dinosaurian making Mesozoic footprints, I could not have been more fearful. For footprints in the Mesozoic mud, or in the sands of time, were as nothing to me when compared with fresh turtle eggs in the sands of this pond.

"But over the strip of sand, without a stop, she paddled, and up a narrow cow-path into the high grass along a fence. Then up the narrow cow-path, on all fours, just like another turtle, I paddled, and into the high wet grass along the fence.

"I kept well within sound of her, for she moved recklessly, leaving a trail of flattened grass a foot and a half wide. I wanted to stand up, — and I don't believe I could have turned her back with a rail, — but I was afraid if she saw me that she might return indefinitely to the pond; so on I went, flat to the ground, squeezing through the lower rails of the fence, as if the field beyond were a melon-patch. It was nothing of the kind, only a wild, uncomfortable pasture, full of dewberry vines, and very discouraging. They were excessively wet vines and briery. I pulled my coat-sleeves as far over my fists as I could get them, and with the tin pail of sand swinging from between my teeth to avoid noise, I stumped fiercely, but silently, on after the turtle.

"She was laying her course, I thought, straight down the length of this dreadful pasture, when, not far from the fence, she suddenly hove to, warped herself short about, and came back, barely clearing me, at a clip that was thrilling. I warped about, too, and in her wake bore down across the corner of the pasture, across the powdery public road, and on to a fence along a field of young corn.

"I was somewhat wet by this time, but not so wet as I had been before, wallowing through the deep dry dust of the road. Hurrying up behind a large tree by the fence, I peered down the corn-rows and saw the turtle stop, and begin to paw about in the loose soft soil. She was going to lay!

"I held on to the tree and watched, as she tried this place, and that place, and the other place — the eternally feminine! — But *the* place, evidently, was hard to find. What could a female turtle do with a whole field of possible nests to choose from? Then at last she found it, and whirling about, she backed quickly at it, and, tail first, began to bury herself before my staring eyes.

"Those were not the supreme moments of my life; perhaps those moments came later that day; but those certainly were among the slowest, most dreadfully mixed of moments that I ever experienced. They were hours long. There she was, her shell just showing, like some old hulk in the sand alongshore. And how long would she stay there? and how should I know if she had laid an egg?

"I could still wait. And so I waited, when, over the freshly awakened fields, floated four mellow strokes from the distant town clock.

"Four o'clock! Why there was no train until seven! No train for three hours! The eggs would spoil! Then with a rush it came over me that this was Sunday morning, and there was no regular seven o'clock train, — none till after nine.

"I think I should have fainted had not the turtle just then begun crawling off. I was weak and dizzy; but there, there in the sand, were the eggs! and Agassiz! and the great book! And I cleared the fence, and the forty miles that lay between me and Cambridge, at a single jump. He should have them, trains or no. Those eggs should go to Agassiz by seven o'clock, if I had to gallop every mile of the way. Forty miles! Any horse could cover it in three hours, if he had to; and upsetting the astonished turtle, I scooped out her round white eggs.

"On a bed of sand in the bottom of the pail I laid them, with what care my trembling fingers allowed; filled in between them with more sand; so with another layer to the rim; and covering all smoothly with more sand, I ran back for my horse.

"That horse knew, as well as I, that the turtles had laid, and that he was to get those eggs to Agassiz. He turned out of that field into the road on two wheels, a thing he had not done for twenty years, doubling me up before the dashboard, the pail of eggs miraculously lodged between my knees.

"I let him out. If only he could keep this pace all the way to Cambridge! or even halfway there; and I would have time to finish the trip on foot. I shouted him on, holding to the dasher with one hand, the pail of eggs with the other, not daring to get off my knees, though the bang on them, as we pounded down the wood road, was terrific. But nothing must happen to the eggs; they must not be jarred, or even turned over in the sand before they came to Agassiz.

"In order to get out on the pike it was necessary to drive back away from Boston toward the town. We had nearly covered the distance, and were rounding a turn from the woods into the open fields, when, ahead of me, at the station it seemed, I heard the quick sharp whistle of a locomotive.

"What did it mean? Then followed the *puff, puff, puff,* of a starting train. But what train? Which way going? And jumping to my feet for a longer view, I pulled into a side road, that paralleled the track, and headed hard for the station.

"We reeled along. The station was still out of sight, but from behind the bushes that shut it from view, rose the smoke of a moving engine. It was perhaps a mile away, but we were approaching, head on, and topping a little hill I swept down upon a freight train, the black smoke pouring from the stack, as the mighty creature pulled itself together for its swift run down the rails.

"My horse was on the gallop, going with the track, and straight toward the coming train. The sight of it almost maddened me — the bare thought of it, on the road to Boston! On I went; on it came, a half — a quarter of a mile between us, when suddenly my road shot out along an unfenced field with only a level stretch of sod between me and the engine.

"With a pull that lifted the horse from his feet, I swung him into the field and sent him straight as an arrow for the track. That train should carry me and my eggs to Boston!

"The engineer pulled the rope. He saw me standing up in the rig, saw my hat blow off, saw me wave my arms, saw the tin pail swing in my teeth, and he jerked out a succession of sharp halts! But it was he who should halt, not I; and on we went, the horse with a flounder landing the carriage on top of the track.

"The train was already grinding to a stop; but before it was near a standstill, I had backed off the track, jumped out, and, running down the rails with the astonished engineers gaping at me, had swung aboard the cab.

"They offered no resistance; they hadn't had time. Nor did they have the disposition, for I looked strange, not to say dangerous. Hatless, dew-soaked, smeared with yellow mud, and holding, as if it were a baby or a bomb, a little tin pail of sand.

"'Crazy,' the fireman muttered, looking to the engineer for his cue.

"I had been crazy, perhaps, but I was not crazy now.

"'Throw her wide open,' I commanded. 'Wide open! These are fresh turtle eggs for Professor Agassiz of Cambridge. He must have them before breakfast.'

"Then they knew I was crazy, and evidently thinking it best to humor me, threw the throttle wide open, and away we went.

"I kissed my hand to the horse, grazing unconcernedly in the open field, and gave a smile to my crew. That was all I could give them, and hold myself and the eggs together. But the smile was enough. And they smiled through their smut at me, though one of them held fast to his shovel, while the other kept his hand upon a big ugly wrench. Neither of them spoke to me, but above the roar of the swaying engine I caught enough that they were driving under a full head of steam, with the intention of handing me over to the Boston police, as perhaps the easiest way of disposing of me.

"I was only afraid that they would try it at the next station. But that station whizzed past without a bit of slack, and the next, and the next; when it came over me that this was the through freight, which should have passed in the night, and was making up lost time.

"Only the fear of the shovel and the wrench kept me from shaking hands with both men at this discovery. But I beamed at them; and they at me. I was enjoying it. The unwonted jar beneath my feet was wrinkling my diaphragm with spasms of delight. And the fireman beamed at the engineer, with a look that said, 'See the lunatic grin; he likes it!'

"He did like it. How the iron wheels sang to me as they took the rails! How the rushing wind in my ears sang to me! From my stand on the fireman's side of the cab I could catch a glimpse of the track just ahead of the engine, where the ties seemed to leap into the throat of the mile-devouring monster. The joy of it! of seeing space swallowed by the mile!

"I shifted the eggs from hand to hand and thought of my horse, of Agassiz, of the great book, of my great luck, — luck, — luck, — until the multitudinous tongues of the thundering train were all chiming 'luck! luck! luck!' They knew! they understood! This beast of fire and tireless wheels was doing its very best to get the eggs to Agassiz!

"We swung out past the Blue Hills, and yonder flashed the morning sun from the towering dome of the State House. I might have leaped from the cab and run the rest of the way on foot, had I not caught the eye of the engineer watching me narrowly. I was not in Boston yet, nor in Cambridge either. I was an escaped lunatic, who had held up a train, and forced it to carry me to Boston.

"Perhaps I had overdone the lunacy business. Suppose these two men should take it into their heads to turn me over to the police, whether I would or no? I could never explain the case in time to get the eggs to Agassiz. I looked at my watch. There were still a few minutes left, in which I might explain to these men, who, all at once, had become my captors. But it was too late. Nothing could avail against my actions, my appearance, and my little pail of sand.

"I had not thought of my appearance before. Here I was, face and clothes caked with yellow mud, my hair wild and matted, my hat gone, and in my full-grown hands a tiny tin pail of sand, as if I had been digging all night with a tiny tin shovel on the shore! And thus to appear in the decent streets of Boston of a Sunday morning!

"I began to feel like a hunted criminal. The situation was serious, or might be, and rather desperately funny at its best. I must in some way have shown my new fears, for both men watched me more sharply.

"Suddenly, as we were nearing the outer freight-yard, the train slowed down and came to a stop. I was ready to jump, but I had no chance. They had nothing to do, apparently, but to guard me. I looked at my watch again. What time we had made! It was only six o'clock, with a whole hour to get to Cambridge.

"But I didn't like this delay. Five minutes — ten — went by.

"'Gentlemen,' I began, but was cut short by an express train coming past. We were moving again, on — into a siding; on — on to the main track; and on with a bump and a crash and a succession of crashes, running the length of the train; on at a turtle's pace, but on, — when the fireman, quickly jumping for the bell-rope, left the way to the step free, and — the chance had come!

"I never touched the step, but landed in the soft sand at the side of the track, and made a line for the yard fence.

"There was no hue or cry. I glanced over my shoulder to see if they were after me. Evidently their hands were full, and they didn't know I had gone.

"But I had gone; and was ready to drop over the high board-fence, when it occurred to me that I might drop into a policeman's arms. Hanging my pail in a splint on top of a post, I peered cautiously over — a very wise thing to do before you jump a high board-fence. There, crossing the open square toward the station, was a big, burly fellow with a club — looking for me.

"I flattened for a moment, when some one in the yard yelled at me. I preferred the policeman, and grabbing my pail I slid over to the street. The policeman moved on past the corner of the station out of sight. The square was free, and yonder stood a cab!

"Time was flying now. Here was the last lap. The cabman saw me coming, and squared away. I waved a paper dollar at him, but he only stared the more. A dollar can cover a good deal, but I was too much for one dollar. I pulled out another, thrust them both at him, and dodged into the cab, calling, 'Cambridge!'

"He would have taken me straight to the police-station, had I not said, 'Harvard College. Professor Agassiz's house! I've got eggs for Agassiz'; and pushed another dollar up at him through the hole.

"It was nearly half-past six.

"'Let him go!' I ordered. 'Here's another dollar if you make Agassiz's house in twenty minutes. Let him out; never mind the police!'

"He evidently knew the police, or there was none around at that time on a Sunday morning. We went down the sleeping streets, as I had gone down the wood roads from the pond two hours before, but with the rattle and crash now of a fire brigade. Whirling a corner into Cambridge Street, we took the bridge at a gallop, the driver shouting out something in Hibernian to a pair of waving arms and a belt and brass buttons.

"Across the bridge with a rattle and jolt that put the eggs in jeopardy, and on over the cobble-stones, we went. Half standing, to lessen the jar, I held the pail in one hand and held myself in the other, not daring to let go even to look at my watch.

"But I was afraid to look at the watch. I was afraid to see how near to seven o'clock it might be. The sweat was dropping from my nose, so close was I running to the limit of my time.

"Suddenly there was a lurch, and I dove forward, ramming my head into the front of the cab, coming up with a rebound that landed me across the small of my back on the seat, and sent half of my pail of eggs helter-skelter over the floor.

"We had stopped. Here was Agassiz's house; and without taking time to pick up the scattered eggs, I tumbled out, and pounded at the door.

"No one was astir in the house. But I would stir them. And I did. Right in the midst of the racket the door opened. It was the maid.

"'Agassiz,' I gasped, 'I want Professor Agassiz, quick!' And I pushed by her into the hall.

"'Go 'way, sir. I'll call the police. Professor Agassiz is in bed. Go 'way, sir!'

"'Call him — Agassiz — instantly, or I'll call him myself.'

"But I didn't; for just then a door overhead was flung open, a great white-robed figure appeared on the dim landing above, and a quick loud voice called excitedly, —

"'Let him in! Let him in. I know him. He has my turtle eggs!'

"And the apparition, slipperless, and clad in anything but an academic gown, came sailing down the stairs.

"The maid fled. The great man, his arms extended, laid hold of me with both hands, and dragging me and my precious pail into his study, with a swift, clean stroke laid open one of the eggs, as the watch in my trembling hands ticked its way to seven — as if nothing unusual were happening to the history of the world."

"You were in time then?" I said.

"To the tick. There stands my copy of the great book. I am proud of the humble part I had in it."

* * * * * *

THE ROLE OF THE TEACHER

If it were simply a matter of processing, it would be easy enough to put twice as many young Americans through college. They could merely be allowed to educate themselves. Correspondence schools have been doing this sort of thing for a long time. Yet this is not the kind of education the people want, nor what the nation requires. Education being pretty much a matter of attitude of mind, some special guidance, some personal inspiration is necessary. The high intellectual excitement, the breadth of view that go to make a man "educated" can rarely be imparted by a syllabus alone. In the end, all talk of a huge expansion in college enrollment comes down to a thoughtful consideration of the individual student—and the individual teacher.

(Continued on page 40)

CONCERNING THE FUTURE OF THE BIOLOGIST

By Dr. Henry van der Schalie

The editorial work connected with this journal has been carried for many years by Dr. A. M. Keefe. His name is closely connected with the activities of the Society and the long service he has given the organization deserves commendation. In recent years the increasing enrollment at St. Norbert College where he is located, the continuous demands on his time for extra-curricular activities, etc., have made it necessary for him to resign as Editor of THE BIOLOGIST. Consequently, the Council has decided to print only two issues during the 1957-1958 school year: a fall issue with the assistance of Dr. Henry van der Schalie and a spring issue with Dr. Karl Lagler assisting Dr. Keefe. Decisions as to the future of this journal should be made by those in attendance at the next General Meeting (1958). Our constitution clearly emphasizes that the Society functions in accordance to the wishes of the chapter members. Therefore, the delegates chosen to represent the several chapters should be prepared to discuss all problems that concern the publication of this journal. Some aspects of these problems are submitted below:

(1) *Cost of publication*: In recent years the problem of high cost of publication has proven difficult for all organizations that sponsor journals. At most of the recent General Meetings delegates were instructed by their chapters to inquire as to why initiation fees are so high. Or, framing the question in another way: what happens to the funds collected by the National Office? It has been pointed out repeatedly that almost half the amount collected from the new initiates must be used for printing THE BIOLOGIST. Unfortunately, there is no alternative because printing costs are not only high but continue to go higher. When an organization is almost wholly dependent on initiation fees for operating its National Office, the brunt of the cost must of necessity fall on the initiates. What are the possibilities for alleviating these conditions?

(2) *Need for interest at the Chapter level*: The members of the National Council have made a continuous effort to emphasize that this journal belongs to the membership of the Society and that the publication will prove interesting and worthwhile only when the *members* of Phi Sigma make an effort to provide articles of high standard. With this objective in mind each chapter has been urged to elect a chapter editor who should supply THE BIOLOGIST editor with articles, notes and news of general interest. It is no secret that over the years a much more lively and wholesome interest in this aspect of the Society activity would prove helpful. Unless more effort is made at the chapter level one would not expect to have a journal that provides stimulating articles of lasting

value. The journal can be only as good as the members of the Society itself will make it. How can we stimulate the interest of the membership at large in their journal?

(3) *Should THE BIOLOGIST be continued? In what form?:* If this journal is to continue it will be necessary for the Society to find someone both able and interested in carrying the editorial work. The next two issues are being managed in an interim way. It would be helpful if the Council could receive suggestions from the chapters so as to obtain the names and information concerning those interested and qualified to handle the work of the editorial office. It is an important post and requires the services of someone with the capabilities and interest in editorial work. The publication of THE BIOLOGIST, perhaps more than any other activity, serves to stimulate interest and enables the members of the Society to share information of mutual interest. It is also useful in helping all members to get informed about the affairs of the Society. As a journal it is unique in that it serves as a medium for the publication of articles with a wide range of diversity and for a group that would otherwise not have an adequate outlet for publication. It would be a great loss to the Society and its membership if THE BIOLOGIST were discontinued. The time has come to take stock and the matter urgently needs constructive thought and some definite planning.

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HONOR SOCIETIES AND THE FUTURE*

By Dean Robert W. Bishop

In any field of worthy endeavor, there is no substitute for excellence. The member societies of the Association of College Honor Societies recognize that excellence and mark the accomplishments of certain men and women by honoring them with membership in their respective societies.

Honor societies have for their purpose the banding together of persons of superior ability and achievement, thus providing the means of cross-fertilization of ideas and ideals, and of spurring the members on to further accomplishment. The history and development of honor societies in this country furnish abundant proof of this purpose. Beginning with Phi Beta Kappa at the College of William and Mary in 1776, they have come into existence in nearly every field of educational endeavor. To an increasing degree during the last three decades, they justify their

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*An address given at the annual meeting of the Council of the Association of College Honor Societies, Cincinnati, Ohio, March 1, 1953. Dr. Bishop is dean of men at the University of Cincinnati and secretary and editor of Omicron Delta Kappa, men's leadership honor society.

(Continued on page 39)

NOTES

Phi Sigma is a member of the Association of College Honor Societies (ACHS). The following description of our Society appears in the Bulletin of ACHS:

PHI SIGMA

(Biological Sciences, All Pure and Applied Fields)
(Men and Women)

Admitted to ACHS 1950

Founded at Ohio State University, March 17, 1915

Number of Active Chapters: *37*

Total Membership: *23,260*

Magazine: *The Biologist*

PURPOSE: To promote interest in research in the biological sciences.

ELIGIBILITY: Students who are enrolled in an accredited college or university, who have shown *research interest,* and who have received an equivalent of at least two years of college credit of which at least one-fourth is in biological science, with a scholarship rating in the upper 35 per cent of their class, shall be eligible for active membership. *This minimum ACHS requirement is modified by chapter by-laws; at least a "B" average is expected together with other qualifications suitable to the local chapters — particularly for graduate students.*

MAJOR ACTIVITIES: Each chapter plans its own programs with a wide variety of activities, ranging from the presentation of papers by the members and lectures by outside speakers, to field trips, *laboratory demonstrations, and projects.* Biennial meetings are held at which delegates from each active chapter meet with the Council for the purpose of formulating policies and transacting all important business of the Society. *The national organization annually cooperates with each school that maintains an active chapter in presenting award certificates to one outstanding undergraduate and one outstanding graduate student in any of the biological sciences — pure or applied. A number of chapters supplement these certificates with monetary awards.*

IX INTERNATIONAL BOTANICAL CONGRESS

The Ninth International Botanical Congress will be held in Montreal, Canada, from August 19 to 29, 1959, at McGill University and the University of Montreal. The program will include papers and symposia related to all branches of pure and applied botany. A first circular giving information on program, accommodation, excursions, and other detail will be available early in 1958. This circular and subsequent circulars including application forms will be sent only to those who write to the Secretary-General asking to be placed on the Congress mailing list:

Dr. C. Frankton
Secretary-General
IX International Botanical Congress
Science Service Building
Ottawa, Ontario
Canada

* * * * * *

PERSPECTIVES IN BIOLOGY AND MEDICINE, a new quarterly journal dedicated to a multidisciplined approach to the problems of biology and medicine, is announced by the Division of Biological Sciences and the Press of the University of Chicago.

PERSPECTIVES will present new hypotheses and concepts representing informed thinking; interpretive, selective essays which take stock of the implications of recent and current research and indicate strategy for the future; and, because perspective and inspiration can also be gained by looking to the past, reviews by great men in science and medicine of their formative years and their philosophy of research.

* * * * * *

WHAT IS AN AMERICAN COLLEGE FOR, ANYWAY?

A big part of the future job is to see that only those who will profit from the college experience be encouraged to enter. There is being propagated an alarming idea that virtually every high-school graduate, regardless of motivation and aptitude, should have the privilege of attending a college of some sort. If this propaganda succeeds, the term "higher education" will be as perverted in America as is the term of "people's democracy" in Russia. Young people lacking the qualities which enable them to succeed in college should go to work. What has happened in the secondary schools since the upward extension of the school-leaving age should constitute a lesson to collegiate educators.

(Continued on page 35)

NEW BOOKS

(Arranged alphabetically by the author's name)

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Altenburg, Edgar; GENETICS; Henry Holt & Co., 383 Madison Ave., New York 17, N. Y. 496 pp. ills. 1957. $6.50. 57-5693

Adler, Irving; HOW LIFE BEGAN; John Day Co., 62 W. 45th St., New York 36, N. Y. 128 pp. ills. 1957. $2.95. 57-7415

Bainbridge & Menzies; (rev.) ESSENTIALS OF PHYSIOLOGY; Longmans Green & Co., 55 Fifth Ave., New York 3, N. Y. 506 pp. 131 figs. 1957 (10th ed.) $7.00.

Barer, R.; USE OF THE MICROSCOPE; Charles C. Thomas, 301 East Lawrence, Springfield, Illinois. 76 pp. 8 figs. 1957. $1.50.

Benson, Lyman; PLANT CLASSIFICATION; D. C. Heath & Co., Englewood, N. J. 688 pp. ills. 1957. $9.00. 57-6313

Beatty, R. A.; PARTHENOGENESIS AND POLYPLOIDY IN MAMMALIAN DEVELOPMENT; Cambridge Univ. Press, 32 East 57th St., New York 22, N. Y. 132 pp. 5 figs. 2 pls. 1957. $3.00.

Black, C. A.; SOIL-PLANT RELATIONSHIPS; John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. 332 pp. figs. diags. 1957. $7.00. 57-10803

Burt, Wm. H.; MAMMALS OF THE GREAT LAKES REGION; University of Michigan Press, Ann Arbor, Mich. 246 pp. 54 figs. 3 tabs. 1957. $4.75. 57-5141

Champneys, H. & Withner, C. L.; ENCYCLOPEDIA OF ROSES & ROSE CULTURE; Prentice-Hall, Inc., 70 Fifth Ave., New York 11, N. Y. 226 pp. 9 col. ills. 60 b.&w. 1957. $7.50. 57-6172

Chauvois, Louis; WILLIAM HARVEY; Philosophical Library, 15 East 40th St., New York 16, N. Y. 271 pp. 14 figs. 18 pls. 1957. $7.50.

Clarke, Arthus C.; THE REEFS OF TAPROBANE; Harper & Brothers, 49 E. 33rd St., New York 16, N. Y. 205 pp. 40 ills. 1957. $5.00. 57-6136

Cobb, Boughton; FIELD GUIDE TO THE FERNS; Houghton Mifflin Co., 2 Park St., Boston, Mass. 281 pp. 1956. $3.95. 55-10024

Cochran, W. G. & Cox, G. M.; EXPERIMENTAL DESIGNS; John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. 611 pp. $10.25. 57-5908

Condoyannis, Geo. E.; SCIENTIFIC GERMAN; John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. 164 pp. 1957. $3.00. 57-8534

Cook, J. Gordon; THE WORLD OF WATER; Dial Press, 461 Fourth Ave., New York 16, N. Y. 192 pp. 1957. $3.00. 57-8536

Cowgill, R. W. & Pardee, A. B.; EXPERIMENTS IN BIOCHEMICAL RESEARCH TECHNIQUES; John Wiley & Sons., 440 Fourth Ave., New York 16, N. Y. 189 pp. 21 figs. 1957. $3.50.

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De La Rue, Bourliere and Harroy; THE TROPICS; Alfred A. Knopf Inc., 501 Madison Ave., New York 22. 208 pp. 80 ills. 34 col. 1957. $12.50.

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Elliott, Alfred M.; ZOOLOGY; Appleton-Century-Crofts, 35 W. 32nd St., New York 1, N. Y. 746 pp. ills. 1957. $7.00. 57-8900

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Glass, Bentley; SURVEY OF BIOLOGICAL PROGRESS, (Vol. 2); Academic Press, 111 Fifth Ave., New York 3, N. Y. 332 pp. 1957. $7.50. 49-11497

Greenberg, David M.; CHEMICAL PATHWAYS OF METABOLISM, (Vols. 1 & 2); Academic Press, 111 Fifth Ave., New York 3, N. Y. 843 pp. ills. 1957. $11.00 & $9.50.

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Hagan, W. A. & Bruner, D. W.; INFECTIOUS DISEASES OF DOMESTIC ANIMALS; Comstock Pub. Associates, 124 Roberts Place, Ithaca, N. Y. 968 pp. 171 figs. 1957. $10.50.

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Higbee, Edward; AMERICAN OASIS; Alfred A. Knopf, New York, N. Y. 269 pp. 16 pls. 1957. $5.00. 56-5788

Heinz, H. J.; NUTRITIONAL DATA; H. J. Heinz Co., P. O. Box 57, Pittsburgh, Pa. 157 pp. 56-10830

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Horkheimer, M. F. & Diffor, J. W.; EDUCATORS GUIDE TO FREE FILMS; Educators Progress Service, Randolph, Wis. 625 pp. 1957. $7.00.

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Locke, W. N.; SCIENTIFIC FRENCH; John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. 112 pp. 1957. $2.25. 57-7625

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Stackman, Elvin & Harrar, J. George; PRINCIPLES OF PLANT PATHOLOGY; Ronald Press Co., 15 East 26th St., New York 10, N. Y. 569 pp. 141 ills. 8 tabs. 1957.

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Watts, May; READING THE LANDSCAPE; Macmillan Co., 60 Fifth Ave., New York 11, N. Y. 230 pp. ills. 1957. $4.75. 57-6359

Williams, R. E. O. & Spicer, C. C. ed.; MICROBIAL ECOLOGY; Cambridge University Press, 32 East 57th St., New York 22, N. Y. 388 pp. figs. 1957. $6.50.

RUSSIAN BIOLOGICAL JOURNAL IN ENGLISH TRANSLATION

Pharmacology and Toxicology, one of the most important Russian biological journals, is available in complete English translation from Consultants Bureau, 227 West 17th Street, New York City, at a yearly subscription rate of $25.00.

Pharmacology and Toxicology is a comprehensive journal, containing more than 600 pages per year, and is published in 6 issues annually. Translation of *Farmakologiya i Toksikologiya* began with the January, 1957 issue, and is presented by special arrangement with the American pharmaceutical industry, at the yearly subscription rate of $25.00. Tables of Contents will be mailed free on request.

Consultants Bureau's English translations of *Pharmacology and Toxicology* are by scientists, specialists in their fields, equally familiar with Russian and the technical terminology. All material is translated cover-to-cover. Journals are staple bound, and include all diagrams, photographs and tabular matter integral with the text.

WHAT IS AN AMERICAN COLLEGE FOR, ANYWAY?

(Continued from page 31)

The high schools have been mandated to accommodate pupils without much ability to learn from books, which, after all, are an unavoidable tool of education at all levels. Our national zeal for education plus early shameful exploitation of child labor has resulted recently in holding too long in secondary schools many boys and girls who should have gone to work. . . .

Higher education must inculcate in the public mind a realization that its *raison d'etre* is not public entertainment on successive autumn weekends, all-male comic opera, and marching bands led by drum majorettes rivaling a Billy Rose extravaganza. Such frou-frou has created the idea that college is primarily a four-year opportunity to make social contacts, a sort of pleasant prolongation of adolescence wherein youth frolics in academic country clubs before facing up to the realities of the adult world. American universities are certainly more than social clubs to which are appended such annoying requirements as academic indexes, diligent study, and reasonable public deportment.

What is a college for, anyway? The primary function of a college is to foster the intellectual growth and training of our capable and purposeful youth. When and if higher education puts this first responsibility foremost before the American people, physical facilities will be enlarged as needed, teachers will be found and adequately rewarded to instruct those admitted, and scholarships will be made available to those able youth who need them.—President John A. Perkins, University of Delaware. (Ginn & Company, 108: 3, 1957)

CHAPTER ACTIVITIES

Under the auspices of Kappa Chapter of Phi Sigma at the University of Kansas, Dr. Karl F. Lagler, National President of Phi Sigma, delivered two addresses on the Kansas campus at Lawrence. The first of these on May 14 was given in the beautiful new wing of the Union Building at the Spring Banquet of the Society in connection with the initiation held each year at this time. Dr. Lagler spoke on "Fishing for Food and for Fun," and raised the interesting questions as to whether or not fisheries can answer some of the hunger problems in the world with which your present-day agriculture is unable to cope. He also pointed up some of the problems that the nations recreational fisheries face in view of the tremendous increase in the angling public that now numbers some 25,000,000 people.

The second lecture was a University seminar in the Dept. of Zoology. Dr. Lagler's subject for this was "The Origin and Dispersal of the Fish of the Great Lakes Region."

On his arrival Dr. Lagler was entertained for lunch, along with the retiring and new officers of Kappa Chapter, by Mrs. Ruth E. McNair, Council representative and long time friend and inspiration of Kappa Chapter. Arrangements for the President's visit were made by W. J. Hausler, Jr. retiring president of Kappa Chapter and Prof. Frank Cross of the Department of Zoology of the University.

ALPHA CHI

-University of the Philippines
Manila, Luzon, P. I.

During the 1956-57 school year, the following scientific lectures were presented: "A Stranger's Glance at the Philippines" by Brother Charles of the Order of Christian Brothers, Professor and Head, Department of Biology, St. Mary's College, Winona, Minnesota; "Studies on Paragonimiasis in the Philippines" by Dr. Mariano G. Yogore, Jr., Assistant Professor and Acting Head, Dept. of Parasitology, Institute of Hygiene, and Head, University Malaria Control Service, University of the Philippines; "The Preparation of Models for Use as Aids in the Teaching of Biological Sciences" by Dr. Lucia A. Manikis, Assistant Professor, Dept. of Zoology, University of the Philippines; "The Ecological Zonation of the Deep Sea" and "Animal Life in the Deep Sea" by Dr. Anton Fr. Bruun, Deputy Keeper, University Zoological Museum, Copenhagen, Denmark and Director of the Galatea Scientific Expedition around the world, 1950-52; "Highlights of the International Genetics Symposia, 1956" by Dr. Jose M. Capinpin, Professor and Head, Dept. of Agricultural

Spring Buffet (Kappa Chapter)
Left to right: Dr. Lagler, Ruth E. McNair, Bill Hausler (President 1956-57)

Left to right: DuWayne Englert, Tom Truffelli, Mrs. William Northey, William Northey (President 1957-58), Barbara Erickson

Botany, University of the Philippines; "Asexual Reproduction in Tunicates" by Dr. Donald P. Abbott, Assistant Professor of Marine Biology, Hopkins Marine Station and Stanford University; "Studies on the Biological Basis and the Economic Importance of the German Shrimp Fisheries, an Example of a Scientific Fishery Investigation" by Dr. Klaus F. W. Tiews, Assistant Scientist, Institute for Coast and Inland Fisheries, Hamburg, Germany, and FAO Technical Assistant to the Bureau of Fisheries on marine fisheries biology; Anniversary Banquet, "The Status of Science in the Philippines" by Dr. Frank Co Tui, Research Director, Creedmoor Institute for Psychobiological Studies, Queens Village, New York.

Charter group of Beta Gamma Chapter at Long Island University, Brooklyn, New York. Taken at installation on April 27, 1957.

Reading from left to right, front row (seated on the floor): Richard Weiner, Philip Cifarelli, Joseph Giglio (graduate student), Stanley Weinreb (graduate student), Arthur Herold, Fred Kahn. Second row: Fred Katz, Richard Arnold, Joseph Oginski, Ronald Cohen, George Valentino, Barry Brenner. Standing: Dr. Edgar A. Tonna, Dr. Joseph Schiller, Dr. Jasper C. Maruzzella, Dr. Phoon T. Young, Dr. Daniel Widelock, Dr. John C. Baiardi, Dr. Charles Tanzer, Dr. Samuel Bieber, Dr. Norman V. Rothwell, Mr. Domenic Firriolo, and Leonard Popowitz (student). Absent are the following: Professor Anthony Iovino, Miss Margaret J. Barbera (graduate student), and the following undergraduate students: Kenneth Goodman, Joseph Greco, Joseph Norato, Emma Lou Quinones, and Stella Venturelli.

HONOR SOCIETIES AND THE FUTURE

(Continued from page 29)

purpose and perform their function of recognition, stimulation, and encouragement.

Many honor societies, indeed the member societies of A.C.H.S., have since their inception, steadfastly stood for the high principles and ideals upon which they were founded. It is noted, however, that there has been an increasing development of societies of the recognition type in all fields, and a number which classify themselves in the honor category, whose membership standards are definitely below A.C.H.S. standards and, in many instances, vague.

In many respects, ours is a day of leveling-off influences, of doing just enough to get by, of general indifference. Some evidence of these leveling influences are found in educational institutions and organizations. There is evident impatience with the time required for the mastery of a study and a failure to use reserves and abilities and to assume responsibilities.

The fine element of excellence as an ideal has suffered in recent years in the schools and colleges as well as in society generally. Unfortunately, the ideas of the common denominator and a conformity have been exalted by some educators. I am sure these influences have made their impact upon member societies in one form or another.

Happily, the A.C.H.S. stands against the current of such thought and strongly advocates an adventure in educational and moral excellence. The Association must continue to encourage those who would join in this adventure if our American heritage is to be something more than mediocre as it is transmitted to those who follow in our train. Member societies must make no substitutes for individual integrity and intelligence. As a definite part of the system of higher education, honor societies have a great responsibility to aid in developing and maintaining worthy standards if they are to contribute to the advancement of society.

Someone has said, "To educate a human mind is not merely to add something to it, but to do something to it."

In a power-technological world, education has gloried in emphasizing technology. As a result, and without intent, the social sciences and humanties are being crowded to the sidelines. Even the great humanizing forces of the home and church have retreated before the advance of the power-technology philosophy, and it is observed today that they have less influence on the personal quality of a growing boy than ever before.

The more ways discovered for harnessing nature for the potential good of mankind, the more men fear that people will use the new power and technical advances to destroy each other. There is, then, a debilitating doubt and lack of faith in the strength of personal, moral qualities in man to guide our destinies.

Honor societies must do their part to guard against moving into an era of the mass mind which is impersonal, lacking in generosity, selfish and undemocratic, and seeks to impose its will by physical power.

I would like to say just a word about "overspecialization" and the resulting duplication which comes from it. The trend in recent years has been in the direction of more and bigger societies and organizations for almost every conceivable subject and interest. They call themselves honor societies and many of them also use "social," "service" or "professional" in their names. Quite a number of them require for membership only a "C" average and an interest in the subject, and some groups have no recorded membership standards at all. Almost all of them function as social, professional, or service clubs. This overlapping specialization and misuse of nomenclature is confusing not only to students and faculty, but also to the general public, to say nothing of campus and general newspapers and magazines. This situation tends to reduce the meaning and value of honor societies of worth, and contributes to the leveling-down influences about which I have spoken.

A CRISIS IN LEARNING

(Continued from page 11)

Part of the dilemma of modern man — and of modern education — consists in this simultaneous demand for technical mastery and for liberal understanding. To keep the world machine going, an ever-increasing supply of highly trained experts is imperative. But it is precisely the narrowness of vision resulting from the concentration necessary to produce the experts that may cause that ignorance of the whole which can destroy the delicate balance of the civilized order.— Philip H. Phenix, Teachers College, Columbia. (Ginn & Company, 108: 1, 1957)

THE ROLE OF THE TEACHER

(Continued from page 27)

Teachers are expendable—especially before tenure sets in. Plant has to be maintained and added to judiciously; teachers, it seems, can always be recruited at a moment's notice, and their course burden increased without limit. As long as they fulfill some requirement, such as the Ph.D. degree or a list of publications, it is assumed that their teaching will be adequate.

It takes a long time, however, to complete graduate training, and the slump in employment opportunities since 1950 (at least in the humanities) has not encouraged sensible young men to enter the profession. Thus it is estimated that when the enrollment wave really hits, only 20% of teachers needed then can be expected to have the Ph.D. degree. This may be a good thing. Whereas a top-notch teacher is always a scholar, a good scholar is by no means necessarily a good teacher. If the expected flood of students has the effect of putting the emphasis more on actual teaching performance than on professional training much, it appears, will have been gained. (Ginn & Company, 107: 4, 1957)

THE BIOLOGIST

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MILE POSTS

1915	March 17, Alpha Chapter organized, Ohio State University, Columbus.
1916	May, Central Governing Body organized, "Biologist" first issued.
1924	December, First National Meeting, Constitution revised, Washington, D. C.
1925	December, Second National Meeting, Kansas City.
1926	December, Third National Meeting, Philadelphia.
1928	December, Fourth National Meeting, New York, Coat-of-arms adopted.
1930	January, Council Meeting, Ritual revised, Norman, Okla. December, Fifth National Meeting, Cleveland.
1931	Phi Sigma Letters Registered, U. S. Patent Office.
1933	June, Sixth National Meeting, Chicago.
1935	December, Seventh National Meeting, St. Louis.
1937	December, Eighth National Meeting, Indianapolis.
1939	December, Ninth National Meeting, Silver Anniversary, Ohio State University, Columbus.
1941	December, Tenth National Meeting, Dallas, Texas.
1946	December, Eleventh National Meeting, Boston, Mass.
1948	December, Twelfth Meeting, Albuquerque, N. Mex.
1950	December, Thirteenth Meeting, Denver and Boulder, Colo.
1952	December, Fourteenth Meeting, St. Louis, Mo.
1954	September, Fifteenth Meeting, Gainesville, Fla.
1956	September, Sixteenth Meeting, Ann Arbor, Mich.

Phi Sigma is a Member of the Association of College Honor Societies, and Associate Member of both the A.A.A.S. and the A.I.B.S.

CHAPTERS FOUNDED

ALPHA — Ohio State University, Columbus, Ohio, 17 March 1915.

BETA — University of Michigan, Ann Arbor, Michigan, 3 June 1916.

GAMMA — North Dakota Agricultural College, Fargo, North Dakota (1916).

DELTA — University of Maine, Orono, Maine, 27 January 1917.

EPSILON — University of Denver, Denver, Colorado, 5 March 1917.

ZETA — University of Wisconsin, Madison, Wisconsin, 30 May 1917.

ETA — University of Akron, Akron, Ohio, 20 April 1921.

THETA — Michigan State College, Lansing, Michigan, 9 April 1921.

IOTA — Washington University, St. Louis, Missouri, 28 May 1921.

KAPPA — University of Kansas, Lawrence, Kansas, 31 May 1921.

LAMBDA — University of Montana, Missoula, Montana, 4 May 1921.

MU — University of California, Berkeley, California, 27 April 1922.

NU — Washington and Jefferson College, Washington, Pennsylvania, 11 May 1922.

XI — University of Nebraska, Lincoln, Nebraska, 3 May 1924.

OMICRON — University of North Dakota, Grand Forks, North Dakota, 26 May 1924.

PI — Emory University, Georgia, 3 January 1925.

RHO — University of Illinois, Urbana, Illinois, 28 March 1925.

SIGMA — University of Florida, Gainesville, Florida, 4 December 1925.

TAU — Duke University, Durham, North Carolina, 4 March 1926.

UPSILON — Miami University, Oxford, Ohio, 7 May 1926.

PHI — University of New Hampshire, Durham, New Hampshire, 21 May 1926.

CHI — Montana State College, Bozeman, Montana, 11 February 1927.

PSI — University of Washington, Seattle, Washington, 7 April 1928.

OMEGA — University of Oklahoma, Norman, Oklahoma, 24 March 1928.

ALPHA ALPHA — University of Southern California, Los Angeles, California, 17 May 1928.

ALPHA BETA — Mount Union College, Alliance, Ohio, 17 May 1928.

ALPHA GAMMA — University of South Dakota, Vermillion, South Dakota, 15 May 1928.

ALPHA DELTA — Lawrence College, Appleton, Wisconsin, 17 March 1929.

ALPHA EPSILON — University of Pittsburgh, Pittsburgh, Pennsylvania, 23 March 1929.

ALPHA ZETA — College of William and Mary, Williamsburg, Virginia, 19 April 1930.

ALPHA ETA — Oklahoma Agricultural and Mining College, Stillwater, Oklahoma, 13 March 1930.

ALPHA THETA — State College of Washington, Pullman, Washington, May 1930.

ALPHA IOTA — Bucknell University, Lewisburg, Pennsylvania, 9 January 1932.

ALPHA KAPPA — Hunter College, New York City, 8 January 1932.

ALPHA LAMBDA — University of Utah, Salt Lake City, Utah, 13 February 1932.

ALPHA MU — University and State College of Oregon, Eugene-Portland-Corvallis, Oregon, 18 November 1933.

ALPHA NU — University of New Mexico, Albuquerque, New Mexico, 21 April 1935.

ALPHA XI — University of Rhode Island, Kingston, Rhode Island, 17 May 1935.

ALPHA OMICRON — Marquette University, Milwaukee, Wisconsin, 18 June 1938.

ALPHA PI — University of Colorado, Boulder, Colorado, 24 May 1941.

ALPHA RHO — University of Arkansas, Fayetteville, Arkansas, 23 May 1945.

ALPHA SIGMA — University of Texas, Austin, Texas, 2 February 1946.

ALPHA TAU — National University of Mexico, Mexico, D.F., 7 April 1947.

ALPHA UPSILON — University of California at Los Angeles, California, 17 May 1947.

ALPHA PHI — College of Puget Sound, Tacoma, Washington, 28 February 1948.

ALPHA CHI — University of the Philippines, Manila, Luzon, P.I., 12 March 1949.

ALPHA PSI — Virginia Polytechnic Institute, Blacksburg, Virginia, 24 May 1949.

ALPHA OMEGA — University of Georgia, Athens, Georgia, 17 May 1951.

BETA ALPHA — Pennsylvania State Univ., State College, Pennsylvania, 26 May 1955.

BETA BETA — Florida State University, Tallahassee, Florida, 18 February 1956.

BETA GAMMA — Long Island University, Brooklyn, N. Y., 27 April 1957.